

REMARKS

Claims 1-27 are currently pending. Claims 1, 7, 10, 11, 14, 15, 17, 20, and 27 are amended herein. Claim 8 is canceled.

Rejections Under 35 U.S.C. §112

Claims 1-13, 17, 20, and 27 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. To overcome these §112 rejections, the following amendments, which are fully supported by the specification, as originally filed, have been made:

To clarify the meaning of “induce the base,” Claim 1 has been amended to recite that the pressure member is configured to cause the base to apply a force onto the process surface. Claims 11 and 20 have been similarly amended. The pressure member causes the base to apply a force against the process surface. These amendments are fully supported by the specification, as originally filed, at, for example, paragraphs [0032]-[0033].

Claim 7 has been amended to recite that the pressure member is within the cavity.

Claim 10 has been amended to recite “a travel limit range of the base relative to the carrier housing” to provide “the travel limit range of the base” recited in Claim 11 with antecedent basis. The term “travel limit range of the base” means the distance range within which the base may be displaced relative to the carrier housing. Paragraph [0034] of the specification describes “a stop ring 128 which may touch a limiting ring 130 of the holder 106 when the holder is in its lowest vertical position.”

Claim 17 has been amended to recite “further comprising the step of providing relative motion between the base and the process surface.”

Claim 27 has been amended to recite that the carrier head is configured to move the surface of the workpiece along a displacement axis. As recited in Claim 27, the workpiece is held with a carrier head that is configured to move the surface of the workpiece along a displacement axis, and the surface of the workpiece is contacted to a process surface.

Rejections Under 35 U.S.C. §102

Claims 1, 3-7, 10-21, 23, and 25-27 are rejected under 35 U.S.C. §102(e) as being anticipated by Chen et al., U.S. Patent No. 6,857,945. Claim 1 is amended to recite that the pressure member is configured to cause the base to apply a force onto the process surface, wherein a spring constant of the process surface is greater than a spring constant of the pressure member. Claim 14 is amended to recite urging the base with a pressure member to produce a substantially constant force against a process surface. Claim 27 is amended to recite contacting a surface of the workpiece to the process surface with a constant pressure, wherein the carrier head is configured to move the surface of the workpiece along a displacement axis and processing the surface of the workpiece with the processing surface while maintaining the constant pressure. These amendments are fully supported by the specification, as originally filed, at, for example, paragraphs [0032]-[0033] and [0035].

As noted by the Examiner, Chen et al. do not disclose or suggest a pressure member that is configured to cause the base to apply a force onto the process surface, wherein a spring constant of the process surface is greater than a spring constant of the pressure member, as recited in Claims 1 (as amended) and 24. Chen et al. do not teach or suggest a process surface having a greater spring constant than the pressure member. At Col. 1, lines 27-39, Chen et al. disclose “standard” and “fixed-abrasive” polishing pads, but do not teach or suggest a process surface being compressible or having a spring constant, much less a spring constant greater than the spring constant of the pressure member. Furthermore, the Chen et al. apparatus, which has a pressure member 108 between the base and the housing, does not even disclose a compressible process surface, much less a process surface having a greater spring constant than the pressure member. None of the references cited teach any relationship between these two spring constants. Claims 1 (as amended) and 24 are therefore patentable, as they are not anticipated by nor obvious over Chen et al. Claims 3-7 and 10-13, which depend from and include all of the limitations of amended Claim 1, are also patentable. Furthermore, each of the dependent claims recites additional features of particular utility.

Chen et al. do not disclose or suggest applying a constant force or pressure onto or against the process surface, as recited in amended Claims 14 and 27. The specification of the current application teaches, at paragraph [0010], that the amount of force that is applied on a wafer

during processing needs to be constant because, as a wafer is pushed against a compressible layer of a processing surface, the force on the wafer is increased as the compressible layer is compressed more. At paragraph [0033] of the specification, a preferred embodiment of the claimed invention only allows a limited range of motion between the base and the carrier housing and is described as applying a constant force of a spring against a process (WSID) surface during processing of a wafer within the limited range of relative motion allowed. According to this preferred embodiment, "the spring constant of the spring 120 is selected such that it only allows a pre-selected constant force to be exerted by the holder or the wafer surface onto the WSID surface." At paragraph [0035], the specification teaches that the force of applied by the spring causes a process depth 'd' in the WSID and that if the compressibility characteristics of the WSID changes, the 'd' value automatically changes because the force applied by the spring is substantially constant. The holder compensates for these changes "by adjusting its displacement along the z-axis by easily moving up or down," but "due to the predetermined constant force provided by the spring attached to the holder, the force applied by the holder does not change" and is therefore substantially constant.

Chen et al. do not teach or suggest applying a constant force, but instead teach to provide overall polishing uniformity by applying different pressures, using independently controlled pressurized chambers, to different portions of the substrate to compensate for non-uniform polishing rates that are caused by other factors. Chen et al. do not teach or suggest applying a substantially constant force or pressure onto or against a process surface, as recited in amended independent Claims 14 and 27. As discussed above, Chen et al. do not teach or suggest a compressible process surface or polishing pad. Thus, the Chen et al. apparatus does not apply a constant force against the process surface.

Claims 14 and 27, as amended, are therefore patentable as they are not anticipated by Chen et al. Claims 15-21, 23, 25, and 26, which depend from and include all of the limitations of amended Claim 14, are therefore also patentable over Chen et al. Furthermore, each of the dependent claims recites additional features of particular utility.

Rejections Under 35 U.S.C. §103

Claims 2 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chen et al. in view of Kajiwara et al., U.S. Publication No. 2002/0115397. Claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Chen in view of Shendon, U.S. Publication No. 2001/0044268. Claims 8 and 24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Chen. Claim 8 has been canceled.

As discussed above, Chen et al. do not teach or suggest a spring constant of the process surface is greater than a spring constant of the pressure member, as recited in Claim 1 (as amended) and Claim 24. Also as discussed above, Chen et al. do not teach or suggest applying a substantially constant force or pressure onto or against the process surface, as recited in amended Claim 14. Neither Kajiwara et al. nor Shendon supplies the deficiencies of Chen et al. Claims 1 and 14, as amended, are therefore patentable over Chen et al., Kajiwara et al., and Shendon et al., either alone or in combination. Claims 2, 9, 22, and 24, which depend from and include all of the limitations of Claim 1 or Claim 14, are therefore also patentable over Chen et al., Kajiwara et al., and Shendon et al. Furthermore, each of the dependent claims recites further distinguishing features of particular utility.

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Conclusion


Applicants respectfully submit that all of the pending claims are patentably distinguishable over the prior art of record. The cited references, either alone or in combination, do not teach or suggest Applicants' claimed invention.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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